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10/572,643	03/20/2006	Hiroyuki Mochizuki	127380	4777

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EXAMINER	
CROUSE, BRETT ALAN	
ART UNIT	**PAPER NUMBER**
1786	

NOTIFICATION DATE	DELIVERY MODE
12/27/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/572,643	MOCHIZUKI ET AL.	
	Examiner	Art Unit	
	Brett A. Crouse	1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 November 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) *5* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20100603*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Application Status

1. This office action is in response to the amendment, filed 15 November 2010, which amends claims 1-5, 9, and 14, cancels claims 7 and 8, and adds new claim 15.

2. Claims 1-4, 6 and 9-15 are under consideration.

Response to Amendment

3. The objection to the specification is overcome by the amendment, filed 15 November 2010.

4. The rejection of claims 1, 2, 3, 4, 6, 7, 10 under 35 U.S.C. 102(b) as being anticipated by Seo, US 2002/0028349 is overcome by the amendment, filed 15 November 2010.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-4, 6, 9-15 are rejected under 35 U.S.C. 102(e), as being anticipated by Yu et al., US 7,098,060.

Yu teaches:

Column 4, line 42 through column 5, line 26, column 5, lines 41-56, figures 1, 2, teaches an electroluminescent device.

Column 5, lines 27-40, teach the distribution of dopant in the polymer layer can be uniform or non-uniform. The passage additionally teaches the dopants are diffused in the polymer.

Column 6, lines 9-25, teach the dopant distribution in the polymer layer is readily tuned to optimize emission and device performance.

Column 6, lines 26-49, teach the diffusion of dopants into the polymer layer.

Column 7, line 59 through column 8, line 9, teach a polymer buffer layer. The polymer can be doped or undoped. The passage teaches various deposition methods.

Column 8, lines 10-57, teach various polymer hosts such as poly(paraphenylenevinylene), polyphenylenes and polyalkylthiophenes. The passage also teaches various dopants for the polymer hosts including PBD.

Column 8, line 58 through column 9, line 13, figure 3, teaches an electron injection/transport layer. The layer can comprise conjugated polymers, various small molecules and combinations thereof.

Column 11, lines 26-57, example 2, teaches vapor deposition and diffusion of a coumarin green fluorescent dopant into a layer of a poly(p-phenylene) derivative.

Column 13, lines 21-51, examples 7 and 8, teach electroluminescent devices having various fluorescent and phosphorescent dopants diffused therein.

7. Claims 1, 2, 6, 9, 10, 13, 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Tang et al., US 6,066,357, with further evidence provided by Tang et al., US 4,769,292.

Tang teaches:

Column 7, line 44 through column 8, line 39, figure 5, teach an electroluminescent device structure.

Column 8, line 60 through column 9, line 7, column 9, lines 23-32, figures 6 and 7, teach vapor deposition of the dopant and diffusion of the dopant into the polymer layer.

Column 9, line 66 through column 10, line 16, figure 8, teach vapor deposition of dopants which emit red, green and blue light and subsequent diffusion of the dopants into the polymer layer.

Column 10, lines 33-46, claim 8, teach various preferred classes of dopants including coumarins and perylenes.

Column 8, lines 5-11, claim 4, teaches various host polymers including polyparaphenylene, polyparaphenylene vinylene and polythiophene.

Tang et al., US 4,769,292 as further evidence (incorporated by reference into US 6,066,357):

Tang '292 teaches perylene as an electron transporting material.

8. Claims 1-4, 6, 9-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsuo et al., EP 1,143,773.

Matsuo teaches:

Paragraph [0243], teaches various polymers for the organic layer including PPV. The passage additionally teaches the polymer can be mixed with hole or electron transporting materials.

Paragraphs [0168], [0237]-[0238], [0240], teach electron and hole transporting materials including oxadiazole derivatives.

Paragraphs [0146], [0159], teaches the polymer can have both charge transport and luminous materials therein.

Paragraphs [0135]-[0162], [0167]-[0174], teach electroluminescent devices, structure and materials.

Paragraph [0248], teaches that the luminescent dopant is preferably steamed after deposition. This is equated with diffused into the host polymer. The passage also indicates this is preferred in the techniques of examples 2-1 and 2-2.

Paragraphs [0211]-[0217], examples 11, 12, 13, teach the preparation of an electroluminescent device. Paragraph [0211], teaches the luminous molecules are

penetrated into the polymer by steaming. Paragraph [0215], teaches the luminous molecules can additionally be deposited as part of a mixture prior to steaming.

Paragraphs [0255]-[0264], examples 2-1, 2-2, table 2, teach the preparation of electroluminescent device.

Paragraphs [0265]-[0269], example 2-4, table 2, teach as a comparative example the formation of the doped polymer layer by co-deposition from solution by spin coating. The device performance is compared with examples 2-1 and 2-2 and tabulated in table 2. The devices uses 2-(4-biphenyl)-5-(4-t-butylphenyl)-1,3,4-oxadiazole.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1-4, 6, 9, 13, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Samuel et al., US 6,313,261, in view of Matsuo et al., EP 1,143,773.

Samuel teaches:

Claim 1, teaches a light emitting device comprising at least two polymer semiconducting layers. The layers further comprise a hole transporting polymer layer and an electron

transporting polymer layer. The claim further teaches that the electron transporting polymer layer additionally comprises a conjugated polymer.

Claim 10, teaches various electron transport polymers. The passage also teaches the polymer can be doped.

Claim 13, teaches the hole transporting polymer can be a conjugated polymer. Various polymers are claimed including polyparaphenylene, polyparaphenylenevinylene derivatives and polythiophene derivatives. The passage also teaches the polymer can be doped.

Column 2, line 11, identifies phase separation as an issue of doped polymers.

Column 3, lines 25-29, teaches various deposition techniques including electro vacuum deposition processes.

Samuel does not recite:

Samuel does not recite diffusion of the dopant into the polymer layer.

Matsuo teaches:

Paragraph [0243], teaches various polymers for the organic layer including PPV. The passage additionally teaches the polymer can be mixed with hole or electron transporting materials.

Paragraphs [0168], [0237]-[0238], [0240], teach electron and hole transporting materials.

Paragraphs [0146], [0159], teaches the polymer can have both charge transport and luminous materials therein.

Paragraphs [0135]-[0162], [0167]-[0174], teach electroluminescent devices, structure and materials.

Paragraph [0248], teaches that the luminescent dopant is preferably steamed after deposition. The passage also indicates this is preferred in the techniques of examples 2-1 and 2-2.

Paragraphs [0211]-[0217], examples 11, 12, 13, teach the preparation of an electroluminescent device. Paragraph [0211], teaches the luminous molecules are penetrated into the polymer by steaming. Paragraph [0215], teaches the luminous molecules can additionally be deposited as a component of a mixture prior to steaming.

Paragraphs [0255]-[0264], examples 2-1, 2-2, table 2, teach the preparation of electroluminescent devices.

Paragraphs [0265]-[0269], example 2-4, table 2, teach as a comparative example the formation of the doped polymer layer by co-deposition from solution by spin coating. The device performance is compared with examples 2-1 and 2-2 and tabulated in table 2. The devices of examples 2-1 and 2-2 in which the dopant was diffused into the host polymer having a current efficiency of 2.5 times that of the device of example 2-4 in which the dopant was incorporated into the host polymer by co-deposition. The device uses 2-(4-biphenyl)-5-(4-t-butylphenyl)-1,3,4-oxadiazole as an electron transport material.

It would have been obvious to one of ordinary skill in the art to form the doped polymer layer of Samuel by the diffusion technique of Matsuo in order to achieve the improved device performance as suggested by Matsuo in the device of Samuel.

Response to Arguments

11. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues Yu does not teach the mixed layer recited in the instant claims. Attention is directed to the column 11, lines 26-57, example 2, which teaches vapor deposition and diffusion of a coumarin green fluorescent dopant into a layer of a poly(p-phenylene) derivative. Attention is directed to column 11, line 34 of the passage which teaches diffusion. Column 6, lines 26-49, also teach the diffusion of dopants into the polymer layer. The limitations of the instant claims are in product-by-process form. Yu teaches the formation of a polymer layer having fluorescent dopants diffused therein. It is unclear as to what unique structure is imparted to the device by the product-by-process recitation opposite the mixed light emitting layer of Yu.

Applicant argues Tang does not teach the mixed layer recited in the instant claims. Attention is directed to column 11, lines 57-60 of the passage which teach diffusion of the dopants into the light emitting layer. Column 11, line 63 through column 12, line 13 of the passage additionally teach diffusing the dopants into the light emitting layer and suitable materials. The limitations of the instant claims are in product-by-process form. Tang teaches the formation of a polymer layer having fluorescent dopants diffused therein. It is unclear as to what

unique structure is imparted to the device by the product-by-process recitation opposite the mixed light emitting layer of Tang.

Applicant additionally argues with respect to Tang that diffusion is time and temperature dependent. It is noted that instant claim 1 does not limit the diffusion time. Instant claim 1 only requires the time be long enough to allow diffusion. Tang '357 teaches in column 11, lines 38-50 that the diffusion conditions are adequate to cause the dopant layers to substantially vanish as the material of the layer diffuses into the overlying light emitting layer.

Applicant argues Matsuo does not teach the mixed layer recited in the instant claims and supplies a declaration comparing one of the fabrication techniques used by Matsuo with an electroluminescent device formed by the technique of the instant application. Attention is directed to example 1 of Matsuo. Paragraph [0187], teaches the deposition of the luminous material, coumarin 6, and heating on a hot plate. The resulting layer was analyzed and a diffusion profile was observed by Matsuo. Attention is also directed to paragraph [0211], which teaches the luminous molecules can be penetrated into the polymer by steaming. Attention is also directed paragraph [0248], which teaches the layer is preferably steamed after deposition. The passage also indicates this is preferred in the techniques of examples 2-1 and 2-2. The treatment of the layer by this technique is shown by Matsuo to provide improved device performance

Applicant argues opposite Samuel in view of Matsuo that the references alone or in combination fail to teach or suggest the mixed layer recited in the instant claims and supplies a declaration comparing one of the fabrication techniques used by Matsuo with an electroluminescent device formed by the technique of the instant application. Attention is directed to example 1 of Matsuo. Paragraph [0187], teaches the deposition of the luminous

material, coumarin 6, and heating on a hot plate. The resulting layer was analyzed and a diffusion profile was observed by Matsuo. Attention is also directed to paragraph [0211], which teaches the luminous molecules can be penetrated into the polymer by steaming. Attention is also directed paragraph [0248], which teaches the layer is preferably steamed after deposition. The passage also indicates this is preferred in the techniques of examples 2-1 and 2-2. The treatment of the layer by this technique is shown by Matsuo to provide improved device performance.

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brett A. Crouse whose telephone number is (571)-272-6494. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/B. A. C./
Examiner, Art Unit 1794

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1786